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09/827,454	04/06/01	RUGGIERO A	IL-10610

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CHRISTOPHER J. HORGAN
ASSISTANT LABORATORY COUNSEL
LAWRENCE LIVERMORE NATIONAL LABORATORY
P.O. BOX 808, L-703
LIVERMORE CA 94551

EXAMINER	
LEUNG, C	
ART UNIT	PAPER NUMBER
2633	3

DATE MAILED: 08/24/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No.	Applicant(s)	
	09/827,454	RUGGIERO, ANTHONY J.	
	Examiner	Art Unit	
	Christina Y. Leung	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 April 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☒ Claim(s) *38 and 39* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claims 38-39 are objected to because of the following informalities:

The phrase "at least on pump beam" in line 2 of both claims 38 and 39 should be changed to "at least one pump beam." Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 recites the limitation "the plurality of semiconductor laser diodes" in line 3 of the claim. There is insufficient antecedent basis for this limitation in the claim.

4. Claims 10-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 10-11 each recite the limitation "the apertures" in line 1 of the claims. There is insufficient antecedent basis for this limitation in the claim.

5. Claim 34 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 34 recites the limitation "said transmitting means" in lines 3-4 of the claim. Since the claim previously recites a "means for transmitting and receiving," it is unclear

whether the phrase "said transmitting means" refers to the single means which both transmits and receives (as previously recited), or if the claim is meant to be directed to including a transmitting means and a separate receiving means.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 24, 26, 29-30, and 42-44 are rejected under 35 U.S.C. 102(b) as being anticipated by Pepper et al. (US 5038359 A).

Regarding claim 24, Pepper et al. disclose an optical interconnection system (Figure 1) comprising:

a fiber optic device (column 5, lines 17-25) constructed to transmit an interrogating beam (with laser 20); and

a micro-mirror 16 adapted to receive the interrogating beam and transmit the beam to a predetermined phase conjugator (medium 12).

Regarding claim 26, Pepper et al. disclose that the interrogating beam interacts with at least one pump beams operating in the phase conjugator in a substantially parallel manner (Figure 9).

Regarding claim 29, Pepper et al. disclose that the interrogating beam interacts with at least one pump beam operating in the phase conjugator at a transverse angle (Figure 10).

Regarding claim 30, Pepper et al. disclose that the predetermined phase conjugator is one of a plurality of phase conjugators arranged in an array (Figures 9 and 10).

Regarding claim 42, Pepper et al. disclose a method of providing an optical interconnect comprising:

transmitting an interrogating beam from a fiber optic device;

receiving the interrogating beam at a micro-mirror 16 across free space;

transmitting a second beam from micro-mirror to a predetermined phase conjugator 12.

Regarding claim 43, Pepper et al. disclose (Figures 6-10) that the method may further include modulating data onto the second beam at said predetermined phase conjugator (with modulator 62);

transmitting an encoded phase conjugated beam to the micro-mirror 16.

Regarding claim 44, Pepper et al. disclose that the method may further include transmitting a third beam from the micro-mirror to the fiber optic device (Figures 6-10).

8. Claims 34-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Akkapeddi (US 4949056 A).

Regarding claim 34, as well as it may be understood with regard to 35 U.S.C. 112 discussed above, Akkapeddi discloses a system (Figure 1) comprising:

a means 10 for transmitting and receiving an interrogating beam;

a communication station operatively coupled to the transmitting means and having a means 28 for returning a phase conjugate beam to the transmitting and receiving means (column 2, lines 15-60).

Regarding claim 35, Akkapeddi discloses a method (Figure 1) comprising:

transmitting an interrogating beam from a transceiver 10;

receiving the interrogating beam at a communication station;

encoding data (with encoder 26) onto a phase conjugate beam and pumping the encoded phase conjugate reflectivity by nondegenerate four wave mixing (column 2, lines 32-34); and

transmitting the encoded phase conjugate beam back to the transceiver (column 2, lines 15-60).

9. Claim 34 is rejected under 35 U.S.C. 102(b) as being anticipated by Sharp et al. (US 5317442 A).

Regarding claim 34, as well as it may be understood with regard to 35 U.S.C. 112 discussed above, Sharp et al. disclose a system (Figures 2 and 5) comprising:

a means 23 for transmitting and receiving an interrogating beam;

a communication station 50 operatively coupled to the transmitting means and having a means 20 for returning a phase conjugate beam to the transmitting and receiving means (column 2, lines 26-42).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-12, 14-17, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akkapeddi in view of Pepper et al.

Regarding claim 1, Akkapeddi disclose a system (Figure 1) comprising:

a transceiver 10 constructed to transmit an interrogating beam; and

a communication station capable of receiving the interrogating beam.

Akkapeddi further disclose that the communication station includes a phase conjugator but does not specifically disclose that the communication station includes a plurality of phase conjugators arranged in an array.

Pepper et al. (Figures 9-10; column 10, lines 47-68; column 11, lines 1-17) teach that a plurality of phase conjugators arranged in an array may be used in a system to produce a phase conjugate beam as in the system disclosed by Akkapeddi. It would have been obvious to a person of ordinary skill in the art to use a plurality of phase conjugators arranged in an array as taught by Pepper et al. in the system disclosed by Akkapeddi in order to provide a broader area to produce phase conjugation.

Regarding claim 2, Akkapeddi discloses that the communication station is capable of transmitting an encoded phase conjugate beam to the transceiver from the phase conjugator (using encoder 26).

Regarding claim 3, as well as it may be understood with regard to 35 U.S.C. 112 discussed above, Akkapeddi disclose that communication station is configured to respond to the interrogating beam by encoding data into the phase conjugate beam and pumping the encoded phase conjugate beam by intracavity nondegenrate four wave mixing (column 2, lines 32-34).

Regarding claims 4-5, Akkapeddi does not specifically disclose that the encoding of the phase conjugate beam is accomplished at rates exceeding approximately 1 kHz or in the range of approximately 1Ghz to approximately 10 GHz.. However, Pepper et al.

teach that a phase conjugate beam may be encoded at rates including 10 GHz (column 8, lines 32-50). It would have been obvious to a person of ordinary skill in the art to encode the phase conjugate beam as disclosed by Akkapeddi at rates suggested by Pepper et al. as an engineering design choice of an efficient frequency for encoding the beam.

Regarding claim 6, Pepper et al. (Figure 9, elements 148-150) that the plurality of phase conjugators may be arranged in a substantially linear array. Regarding claim 7, Pepper et al. teach that the plurality of phase conjugators may be substantially spaced apart (Figure 9). Regarding claim 9, Pepper et al. teach that that plurality of phase conjugators may be any practical number (column 11, lines 14-17). Regarding claims 6, 7, and 9, it would have been obvious to a person of ordinary skill in the art to use an array of phase conjugators in a configuration as suggested by Pepper et al. in the system disclosed by Akkapeddi as an engineering design choice of a way to arrange the phase conjugators.

Regarding claim 8, neither Akkapeddi nor Pepper et al. specifically disclose or teach that the plurality of phase conjugators may comprise single gain stripe devices, although both disclose that phase conjugators may comprise lasers. Single stripe laser devices are well known in the art. It would have been obvious to a person of ordinary skill in the art to specifically use single stripe gain devices as the lasers in the phase conjugators describe by Akkapeddi in view of Pepper et al. as an engineering design choice. The claimed differences exist not as a result of an attempt by Applicants to solve an unknown problem but merely amount to the selection of expedients known as design choices to one of ordinary skill in the art.

Regarding claim 10, as well as it may be understood with regard to 35 U.S.C. 112 discussed above, Akkapeddi discloses that the aperture of the phase conjugator are sufficient to resolve a substantial portion of the spatial components of the input wavefront of the interrogating beam (Figure 2).

Regarding claim 11, as well as it may be understood with regard to 35 U.S.C. 112 discussed above, Akkapeddi does not specifically disclose that the aperture of the phase conjugator is sufficient to resolve greater than approximately 80% of the spatial components of the input wavefront of the interrogating beam, but discloses that it is able to generally resolve a substantial portion of the input wavefront of the interrogating beam (Figure 2). It would have been obvious to a person of ordinary skill in the art that the system disclosed by Akkapeddi to specifically ensure that the aperture is sufficient to resolve greater than 80% of the spatial components of the input wavefront of the interrogating beam simply in order to ensure that the input wavefront is sufficiently resolved.

Regarding claim 12, Akkapeddi discloses that the communication station does not have a movable part point and tracking system (column 1, lines 28-63; column 2, lines 15-44).

Regarding claim 14, Akkapeddi discloses that the interrogating beam may interact with pump beam operating in the phase conjugator at a substantially transverse angle (Figure 2).

Regarding claim 15, Pepper et al. teach that the interrogating beam may interact with pump beams operating in the plurality of phase conjugators in a substantially parallel manner (Figure 8). It would have been obvious to a person of ordinary skill in the

art to arrange the interrogating beam and pump beams as suggested by Pepper et al. in the system disclosed by Akkapeddi as an engineering design choice of the most convenient angle.

Regarding claim 16, Akkapeddi disclose that the transceiver may be mounted on a satellite (Figure 1).

Regarding claim 17, Akkapeddi disclose that the communication station may be mounted on a ground station.

Regarding claim 41, as similarly discussed with regard to claims 1 and 10 above, Akkapeddi disclose a method (Figures 1 and 2) comprising:

transmitting an interrogating beam from a transceiver;

receiving the interrogating beam at a phase conjugator and resolving a substantial portion of the spatial components of the input wavefront of the interrogating beam;

modulating data onto a phase conjugate beam; and

transmitting the phase conjugate beam to the transceiver.

Again, Akkapeddi does not disclose an array of phase conjugators. However, Pepper et al. (Figures 9-10; column 10, lines 47-68; column 11, lines 1-17) teach that a plurality of phase conjugators arranged in an array may be used in a system to produce a phase conjugate beam as in the method disclosed by Akkapeddi. It would have been obvious to a person of ordinary skill in the art to use a plurality of phase conjugators arranged in an array as taught by Pepper et al. in the method disclosed by Akkapeddi in order to provide a broader area to produce phase conjugation.

12. Claims 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akkapeddi in view of Pepper (US 4767195 A).

Regarding claim 18, Akkapeddi discloses a system (Figures 1 and 2) comprising:

a transceiver 10 constructed to transmit an interrogating beam;

a communication station capable of receiving the interrogating beam; and

the communication station having a phase conjugator 12.

Akkapeddi does not specifically disclose that the phase conjugator includes a top electrode, but does disclose that an aperture is located in the top of the phase conjugator (Figure 2). Pepper teaches a phase conjugator including a top electrode (Figure 11, element 14). It would have been obvious to a person of ordinary skill in the art to use a phase conjugator as taught by Pepper in the system disclosed by Akkapeddi simply as a design choice of a phase conjugator.

Regarding claim 19, Akkapeddi discloses that the interrogating beam interacts with at least one pump beam operating in the phase conjugator at a substantially transverse angle (Figure 2).

Regarding claim 20, neither Akkapeddi nor Pepper disclose that the phase conjugator may comprise a broad-area, distributed feedback laser device, although both disclose and teach that the phase conjugator may comprise a laser. Broad-area, distributed feedback laser devices are well known in the art. It would have been obvious to a person of ordinary skill in the art to specifically use a broad-area, distributed feedback laser devices as the laser in the phase conjugator disclosed by Akkapeddi as an engineering design choice. The claimed differences exist not as a result of an attempt by Applicants to solve an unknown problem but merely amount to the selection of expedients known as design choices to one of ordinary skill in the art.

Regarding claim 21, Akkapeddi does not specifically disclose that the aperture is greater than 10 microns, but it would have been obvious to a person of ordinary skill in the art to specify that the aperture disclosed by Akkapeddi be greater than 10 microns as an engineering design choice of a way to allow light into the phase conjugator.

13. Claims 13 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akkapeddi in view of Pepper et al. and Pepper.

Regarding claim 13, Akkapeddi in view of Pepper et al. describe a system as discussed with regard to claim 1 above. Neither Akkapeddi nor Pepper et al. disclose or teach that the plurality of phase conjugators each have a top electrode with an aperture. However, Akkapeddi does disclose that an aperture is located in the top of the phase conjugator (Figure 2). Pepper teaches a phase conjugator including a top electrode (Figure 11, element 14). It would have been obvious to a person of ordinary skill in the art to use a phase conjugator as taught by Pepper in the system described by Akkapeddi in view of Pepper et al. simply as a design choice of a phase conjugator.

Regarding claim 40, Akkapeddi discloses a method (Figures 1 and 2) comprising:

transmitting an interrogating beam from a transceiver;

receiving the interrogating beam at a phase conjugator through apertures located in the top of the phase conjugator;

modulating data onto a phase conjugate beam; and

transmitting the phase conjugate beam to the transceiver.

Akkapeddi does not disclose an array of phase conjugators. However, Pepper et al. (Figures 9-10; column 10, lines 47-68; column 11, lines 1-17) teach that a plurality of phase conjugators arranged in an array may be used in a system to produce a phase

conjugate beam as in the system disclosed by Akkapeddi. It would have been obvious to a person of ordinary skill in the art to use a plurality of phase conjugators arranged in an array as taught by Pepper et al. in the method disclosed by Akkapeddi in order to provide a broader area to produce phase conjugation.

Again, Akkapeddi also does not specifically disclose that the phase conjugator includes a top electrode, but does disclose that an aperture is located in the top of the phase conjugator (Figure 2). Pepper teaches a phase conjugator including a top electrode (Figure 11, element 14). It would have been obvious to a person of ordinary skill in the art to use a phase conjugator as taught by Pepper in the method disclosed by Akkapeddi simply as a design choice of a phase conjugator.

14. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akkapeddi et al. or Sharp et al.

Regarding claim 22, Akkapeddi (Figures 1 and 2) and Sharp et al. (Figures 2 and 5) disclose a system comprising:

a transceiver constructed to transmit an interrogating beam;

a communication station capable of receiving the interrogating beam; and

the communication station having a phase conjugator which comprises a laser.

Neither Akkapeddi nor Sharp et al. specifically disclose that the phase conjugator may comprise a VCSEL. However, VCSELs are well known in the art. It would have been obvious to a person of ordinary skill in the art to specifically use a VCSEL as the laser in the phase conjugator disclosed by either Akkapeddi or Sharp et al. as an engineering design choice. The claimed differences exist not as a result of an attempt by

Applicants to solve an unknown problem but merely amount to the selection of expedients known as design choices to one of ordinary skill in the art.

15. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akkapeddi or Sharp et al. as applied to claim 22 above, and further in view of Pepper et al.

Regarding claim 23, Akkapeddi or Sharp et al. suggest a system as discussed with regard to claim 22 above. Neither disclose that the interrogating beam interacts with at least one pump beam operating in the phase conjugator in a substantially parallel manner. However, Pepper et al. teach that the interrogating beam may interact with pump beams operating in the phase conjugator in a substantially parallel manner (Figure 8). It would have been obvious to a person of ordinary skill in the art to arrange the interrogating beam and pump beam as suggested by Pepper et al. in the system disclosed by Akkapeddi or Sharp et al. as an engineering design choice of the most convenient angle.

16. Claims 25, 28, and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pepper et al.

Regarding claims 25 and 28, Pepper et al. disclose a system as discussed with regard to claim 24 above. Regarding claim 32, Pepper et al. disclose a system as discussed with regard to claim 30 above.

Pepper et al. also disclose that the phase conjugator may comprise a laser but does not specifically disclose that the laser may be a VCSEL, a broad-area, distributed feedback laser device, or a single gain stripe device. However, VCSELs, broad-area, distributed feedback laser devices, and single stripe laser devices are well known in the art. It would have been obvious to a person of ordinary skill in the art to specifically use a

VCSEL, a broad-area, distributed feedback laser device, or a single stripe laser device as the laser in the phase conjugator disclosed by Pepper et al. as an engineering design choice. The claimed differences exist not as a result of an attempt by Applicants to solve an unknown problem but merely amount to the selection of expedients known as design choices to one of ordinary skill in the art.

Regarding claim 31, Pepper et al. disclose a system as discussed with regard to claim 24 above. They further disclose that the phase conjugators may be one of a plurality of phase conjugators arranged in an array of phase conjugators (Figures 9 and 10). They do not specifically disclose that this array may be a first array of a plurality of arrays, but it would have been obvious to a person of ordinary skill in the art to include a plurality of arrays of phase conjugators in the system disclosed by Pepper et al. as an engineering design choice of a way to arrange the phase conjugators especially since Pepper et al. disclose that any number of phase conjugators may be included (column 11, lines 14-17)

17. Claims 27 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pepper et al. in view of Pepper.

Regarding claims 27 and 33, Pepper et al. disclose a system as discussed respectively with regard to claims 24 and 30 above. They do not specifically teach that the phase conjugator may include a top electrode.

Pepper et al. does disclose that an aperture may be located in the top of the phase conjugator (Figure 10, elements 174, 176, and 178). Pepper teaches a phase conjugator including a top electrode (Figure 11, element 14). It would have been obvious to a person

of ordinary skill in the art to use a phase conjugator as taught by Pepper in the system described by Pepper et al. simply as a design choice of a phase conjugator.

18. Claims 35-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharp et al. in view of Pepper et al.

Regarding claim 35, Sharp et al. disclose a method (Figures 2 and 5) comprising:

transmitting an interrogating beam from a transceiver 52;

receiving the interrogating beam at a communication station 50;

encoding data (with modulator 29) onto a phase conjugate beam; and

transmitting the encoded phase conjugate beam back to the transceiver (column 2, lines 26-42).

Sharp et al. do not specifically disclose pumping the encoded phase conjugate reflectivity by nondegenerate four wave mixing. However, Pepper et al. teach that four wave mixing is a known way of producing phase conjugate beams such as disclosed by Sharp et al. (column 1, lines 29-39). It would have been obvious to a person of ordinary skill in the art to specifically use four-wave as Pepper et al. teaches in the method disclosed by Sharp et al. as a known engineering deign choice of a way to produce the phase conjugate beam.

Regarding claim 36, Sharp et al. disclose a method (Figures 2 and 5) comprising:

transmitting an interrogating beam from a transceiver 52;

receiving the interrogating beam at a phase conjugator;

modulating data onto a phase conjugate beam (with modulator 29); and

transmitting the phase conjugate beam to the transceiver.

Sharp et al. does not specifically disclose an array of phase conjugators. However, Pepper et al. (Figures 9-10; column 10, lines 47-68; column 11, lines 1-17) teach that a plurality of phase conjugators arranged in an array may be used in a system to produce a phase conjugate beam as in the method disclosed by Sharp et al. It would have been obvious to a person of ordinary skill in the art to use a plurality of phase conjugators arranged in an array as taught by Pepper et al. in the method disclosed by Sharp et al. in order to provide a broader area to produce phase conjugation.

Regarding claim 37, Sharp et al. disclose that their method may further comprise collecting data through a sensor 24 located in proximity to the phase conjugator and transmitting the data to the phase conjugator (modulator 29).

Regarding claim 38, Sharp does not specifically disclose that the interrogating beam interacts with at least one pump beam operating in each of the phase conjugators in a substantially parallel manner. However, Pepper et al. teach that the interrogating beam may interact with pump beams operating in the plurality of phase conjugators in a substantially parallel manner (Figure 8). It would have been obvious to a person of ordinary skill in the art to arrange the interrogating beam and pump beams as suggested by Pepper et al. in the method disclosed by Sharp et al. as an engineering design choice of the most convenient angle.

Regarding claim 39, Sharp et al. discloses that the interrogating beam interacts with at least one pump beam operating in the phase conjugator in a substantially transverse manner (Figure 2).

Conclusion

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Y. Leung whose telephone number is 703-605-1186. The examiner can normally be reached on Monday to Friday, 6:30 to 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 703-305-4729. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4700.

JASON CHAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600